

MINIATURIZATION METHODS FOR DEEP SPACE MICROSPACECRAFT

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Due to the shrinking NASA budget, future scientific spacecraft programs will be driven by their "life-cycle" cost. This cost figure, which includes development, integration, launch, and operation, can be reduced by making spacecraft smaller and more autonomous. Such miniature spacecraft allow the launch of several crafts on a single launch vehicle or the launch of a single craft as a "piggyback ride" to a primary payload. Although each of these small spacecraft will not be capable of performing the diversified science that is accomplished by such grand vehicles as Voyager and Magellan, a group of microspacecraft can conduct a composite of many different kinds of valuable science as well as enhance overall mission reliability.

The methodology used in the design of microspacecraft is different than that which is used for traditional planetary spacecraft. This design approach involves the incorporation of advanced miniature technologies as well as the modification of the system architecture so that it can support the desired small mass and size. The progress in miniaturization is evolutionary: size can be reduced from one design to the next by further modifying the system architecture and incorporating even more advanced technologies. This paper will cover the specific approaches used in the evolutionary miniaturization process for a spacecraft designed to accomplish an asteroid flyby mission. A concept for such a microspacecraft and an associated launch strategy are also presented.

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